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WASTE TREATMENT PLANT, GLENWOOD, MINNESOTA

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PROGRESS REPORT

WASTE TREATMENT PLANT

GLENWOOD, MINNESOTA

NOVEMBER 1, 1967 - APRIL 30, 1968

Submitted by

H. ORIN HALVORSON

April 13, 1968

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Springfield VA 22151

Our last progress report included data up through October 31, 1967. The following includes data gathered from November 1, 1967 to April 30, 1968.

We are still handicapped by a heavy infiltration that increases the flow beyond the capacity of the final settling tank. This tank was designed for an average flow of 240,000 gallons per day but during the period reported here the flow has been above 350,000 gallons per day and during the month of April it increased to 553,000 gallons per day. All of these values are averages based upon 28 measurements during the month.

We have brought this information to the attention of the City Council and have requested them to construct either another final tank or a stabilization pond. We would much prefer the former but the latter will enable us to obtain data with adequate final settling. A new final tank would cost about $22,000.00; but the City Council feel that their city is too heavily indebted to allow them to build this. They have agreed to construct a pond following the present settling tank and chlorination chamber. This pond will be large enough to provide a 12 hour detention. They had promised to do this last fall but were delayed by the onset of bad weather. They have promised now to proceed very soon. If the pond is constructed it will be provided with a drainage sewer that will allow us to drain the pond back through the plant in case it becomes necessary to drain to take care of solids that will settle in the pond. This can be done during weekends when the flow otherwise will be light.

The flow inducers that were constructed could not be put into operation until about March. When they were first put into operation we found that the switches provided for the changing of the speed of operation of the impellers were improperly constructed and had to be sent back to the factory for rebuilding. This has now been done and the inducers are now operating satisfactorily. A report concerning them from Mr. Brodie, the designing engineer, is included with this report.

During the winter months from November until the flow inducers could be put into operation we had to depend upon the cage rotors for aeration and impulsion. In order to maintain proper velocity in the channels we had to set these so deep that we obtained too much aeration and as a consequence we built up too much nitrate. This reduces our nitrogen removal and I suspect it also tends to make for a light flock that does not settle as rapidly as it should. This is indicated by the high values of the sludge index. In January and February we tried to correct for this by raising the cage rotors so as to get less aeration. This did reduce the nitrate content of the effluent but it had an adverse effect on the solids since they were not kept in suspension the way they should and this did unfavorably effect our BOD removals. By the time we got the flow inducers to work the flow of sewage increased due to spring thaw and spring rains so we have not had a chance for a fair test of the effects of the flow inducers.

The inadequate settling is reflected in the high amount of suspended solids in the final effluent. If it were not for this we would be getting much better removals than our data indicate. This is shown to a limited extent by the sample data comparing the removals of BOD and Phosphate in the regular effluent and a corresponding laboratory settled effluent.

During the time remaining in our present period of study we plan to get samples from two other channel aeration plants that are now in operation in Minnesota, namely at Grove City and Renville, Minnesota. These two plants do have adequate settling and it will be of interest to see what their removals are in comparison to ours. If our grant period is extended we will continue to get samples from these two plants from time to time and we will then also have better settling in our own plant at Glenwood as soon as the stabilization pond is put into operation.

From time to time sludge is removed from the system by first allowing it to compact in the final tank for about an hour and then pumping it into a tank on a truck, so it can be hauled away. The sludge that is pumped to the tank has about 1.5% solids. The following amounts were hauled for the months listed. A truck load is 1000 gallons.

November	51	loads
December	42	"
January	20	"
February	37	"
March	29	"
April	none	

The data given in the tables to follow are monthly averages, each an average of 20 or more individual determinations. Analysis are generally not made on weekends, Saturday and Sunday.

TABLE I.

MONTH	FLOW	COD		BOD		% BOD REDUCTION
		RAW	EFFLUENT	RAW	EFFLUENT	
November	323,630	262	83.0	126	17.0	86.5
December	351,900	250	76.2	146	17.8	87.8
January	368,900	257	76.0	133.5	17.9	86.5
February	360,000	255	73.9	123.8	20.7	83.8
March	364,000	224	95.3	101.9	14.9	85.3
April	553,200	226	221.4	65.3	36.8	43.6

TABLE II.

MONTH	A SUSPENDED SOLIDS IN CHANNEL GM/LITER	B Ml SETTLED SOLIDS/LITER AFTER 1 HOUR SETTLING	SLUDGE INDEX B/A	SUSPENDED SOLIDS IN EFFLUENT PPM
November	2238	681	304	34.0
December	2300	703	306	34.5
January	2320	394	170	44.0
February	2295	486	212	39.5
March	2163	463	214	50.4
April	1234	357	289	120.9

TABLE III.

MONTH	NITRATE IN EFFLUENT PPM	TOTAL NITROGEN		
		RAW PPM	EFFLUENT PPM	% REMOVAL
November	13.53	23.85	15.99	32.9
December	15.46	25.4	18.30	38.7
January	6.91	26.43	14.14	46.5
February	4.81	28.21	9.86	65.0
March	4.97	22.48	9.60	61.7
April	8.46	17.60	14.27	18.9

TABLE IV.

MONTH	PHOSPHATE		%
	RAW PPM	EFFLUENT PPM	REMOVAL
November	8.2	7.02	14.3
December	8.71	6.55	24.7
January	8.00	6.56	18.0
February	7.13	6.39	10.3
March	7.16	6.64	7.2
April	4.77	4.28	10.2

TABLE V.

COMPARISON OF SETTLING TANK EFFLUENT AND EFFLUENT FROM

LABORATORY SETTLING

DATE		B.O.D. PPM REGULAR EFFLUENT	LABORATORY SETTLED EFFLUENT
April 9, 1968		21.9	10.85
April 10, 1968		17.05	7.74
April 14, 1968		35.5	3.05
April 16, 1968		22.3	10.50
April 19, 1968		19.7	12.6
April 18, 1968		44.6	7.75
	Average	26.84	8.74
		Percentage decrease	67.4
		PHOSPHATE PPM	
April 8, 1968		5.5	2.17
April 9, 1968		7.1	2.40
April 10, 1968		6.8	2.40
April 15, 1968		5.67	3.67
April 18, 1968		6.33	2.83
	Average	6.28	2.69
		Percentage decrease	57.1

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